VACUUM DEPOSITING DEVICE

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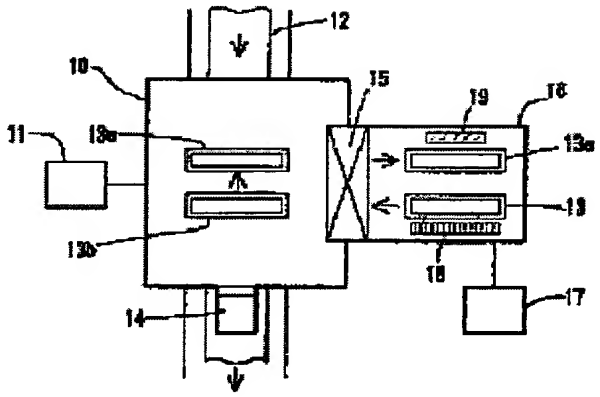
Abstract of **JP6088233**

PURPOSE:To dispense with the exchange of a crucible and opening of a vacuum vessel for a maintenance by providing a preparation chamber on a vacuum vessel containing an evaporation crucible with a vacuum circuit breaker valve and enabling keeping of vacuum of the vacuum vessel even if the preparation chamber is opened. CONSTITUTION:Thin films to be vapor deposited 12 pass in a connected state and vacuum evaporated in the vacuum vessel (a vapor deposition chamber) 10 providing the evaporation crucible 13b. In the vacuum evaporation device, a take-out chamber or a preparation chamber 16 is provided on the vapor deposition chamber 10 with a vapor circuit breaker 15. A means 19 heating the evaporation crucible for exchanging 13 is provided on the preparation chamber 16. Also an used evaporation crucible is accomodated in the take-out chamber.



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(54) [Title of the Invention] Vacuum Evaporation Device

(57) [Abstract]

[Object] To provide a vacuum evaporation device without exposing a vacuum vessel to the air in maintenance, and exchanging an evaporation crucible, further whose downtime is short.

[Constitution]

It is characterized by having a preparation chamber 16 which is provided in an evaporation chamber 10 through a vacuum shutoff valve 15 and which has a heating means 19 to heat an exchange evaporation crucible 13 in a vacuum evaporation device in which vacuum evaporation is done by allowing a thin-plate-like material to be evaporated to continuously pass through an evaporation chamber 10 containing an evaporation crucible.

[Scope of claims]

[Claim 1] A vacuum evaporation device characterized by having a preparation chamber which is provided in a vacuum vessel through a vacuum shutoff valve and which comprises a heating means to heat an exchange evaporation crucible in a vacuum evaporation device in which vacuum-evaporation is done by allowing a thin-plate like material to be evaporated to continuously pass through a vacuum vessel containing an evaporation crucible.

[Claim 2] The vacuum evaporation device according to claim 1, characterized by comprising an extraction chamber which is provided in the vacuum vessel by another vacuum shutoff valve and which contains a used crucible.

[Detailed Description of the Invention]

[0001]

[Industrial field of the Invention] The present invention relates to a vacuum evaporation device in which vacuum evaporation is done by allowing a thin-plate like material to be evaporated to continuously pass through a vacuum vessel containing an evaporation crucible.

[0002]

[Prior art] A vacuum evaporation device is given as a device for forming a film continuously on a thin-plate-like material to be evaporated using an evaporation material made of metal.

[0003] Fig.3 is an external perspective view showing this kind of conventional vacuum evaporation device (manufactured by LEYBOLD (Germany)), and Fig.4 is a schematic view showing its major part.

[0004] In Fig.3 and Fig.4, a vacuum evaporation device comprises an evaporation chamber as a vacuum vessel (hereinafter referred to as an evaporation chamber) 1, a vacuum pump 2 for evacuating air from the evaporation chamber 1 which is connected to the evaporation chamber 1, a fountain roll 4 which is wrapped with a thin-plate-like material to be evaporated 3 for forming a film continuously which is disposed in the evaporation chamber 1, an evaporation crucible 5 (hereinafter referred to as a crucible), which is provided in the evaporation chamber 1 and which contains an evaporation material to be a film, an electron gun 6 for forming a film of an evaporation material on

a material to be evaporated which is pulled out from the fountain roll 4, which is installed in the evaporation chamber 1 and by which is an evaporation material is irradiated with electron beam to be evaporated, a wind roll 7 for rolling up the material to be evaporated 3 which has been already evaporated, and an exchange chamber of a crucible 8 for exchanging a used crucible 5a which is provided in the evaporation chamber 1, so that it can be inserted and taken out.

[0005]

[Problem to be solved by the invention] However, the conventional vacuum evaporation device has the following problems.

[0006] (1) When a crucible in use is exchanged or done maintenance on due to breakage or defect, the evaporation chamber needs to be exposed to the air. Therefore, when a device dimensions becomes large, a long time at re-evacuation air i.e. at rest is required.

[0007] (2) In case that a material of a crucible is ceramic or graphite, and it is put in the evaporation chamber directly, it takes a long time to evacuate gas because a new crucible absorbs much gas.

[0008] (3) In the case that a new crucible is heated outside an evaporation chamber to evacuate gas, it absorbs gas in the air before it is introduced in the evaporation chamber after evacuating gas.

[0009] (4) Since there aren't a heating means for heating a crucible or a device for supplying an evaporation material in the exchange chamber of crucible, it is not possible to evacuate gas or to melt it at the first step.

[0010] An object of the invention is to solve the problems and to provide a vacuum evaporation device which dose not need to expose a vacuum vessel to the air in the maintenance or exchanging an evaporation crucible, and further whose downtime is

short.

[0011]

[Means to solve the problem]

To accomplish the purpose, according to the present invention there is provided a preparation chamber which is provided in a vacuum vessel through a vacuum shutoff valve and which has a heating means to heat an exchange evaporation crucible in a vacuum evaporation device in which vacuum-evaporation is done by allowing a thin-plate like material to be evaporated to continuously pass through a vacuum vessel containing an evaporation crucible.

[0012] In addition, a vacuum evaporation device of the present invention is provided in a vacuum vessel through a vacuum shutoff valve and is provided with an extraction chamber for containing a used crucible.

[0013]

[Operation] According to the above structure, since a preparation chamber is provided through a vacuum shutoff valve in a vacuum vessel, vacuum of the vacuum vessel is maintained even if the preparation chamber is exposed to the air. Also, it is possible to evacuate gas of a crucible for exchange simultaneously during a vacuum evaporation process, and it is possible to use a crucible for exchange without making a pause of a vacuum evaporation device to evacuate gas because the preparation chamber has a heating means.

[0014]

[Embodiment] Hereinafter, an embodiment is explained with reference to the attached drawings.

[0015] Fig.1 is a plane schematic view showing a major part in an embodiment of a

vacuum evaporation device.

[0016] In the same figure, the vacuum evaporation device includes an evaporation chamber 10 as a vacuum vessel, a vacuum pump 11 for evacuating air from the evaporation chamber 10 which is connected to this evaporation chamber 10, a thin-plate-like material to be evaporated 12 for forming a film that passes through the evaporation chamber 10 continuously, an exchange crucible 13 which is provided in the evaporation chamber 10 and contains an evaporation material to form a film on this thin-plate-like material to be evaporated 12, an electron gun 14 which is installed in the evaporation chamber 10 and by which an evaporation material is irradiated with electron beam to be evaporated to form a film of an evaporation material on the thin-plate-like material to be evaporated 12, a vacuum shutoff valve 15 which is put at a side of the evaporation chamber 10, and can open or shut off the evaporation chamber 15, a preparation chamber 16 which is installed in this vacuum shutoff valve 15 and which contains the crucible 13 for exchange and a used crucible 13a, a vacuum pump 17 which is connected to the preparation chamber 16 and evacuate air from the preparation chamber 16, a material supply device 18 which is provided in the preparation chamber 16 and supplies an evaporation material into the exchange crucible 13, and a heating means 19 which is provided in the preparation chamber 16 and heats the exchange crucible 13.

[0017] In the preparation chamber 16, an inserting door to introduce the exchange crucible 13 and a extract door to take out the used crucible 13a are provided (both are not shown), generally these inserting door and taking door are closed.

[0018] A vacuum shutoff valve 15 blocks between the evaporation chamber 10 and the preparation chamber 16 during vacuum evaporation operations, or in inserting the

exchange crucible 13 in a preparation chamber 16, taking out the used crucible 13a from the preparation chamber 16, heating an exchange crucible 13 to evacuate gas, and opens between the evaporation chamber 10 and the preparation chamber 16 in transferring the exchange crucible 13 from the preparation chamber 16 into the evaporation chamber 10, or transferring a used crucible 13a from the evaporation chamber 10 into the preparation chamber 16.

[0019] Transferring of each crucible 13, 13a between the evaporation chamber 10 and the preparation chamber 16 is performed by an unshown transfer mechanism.

[0020] As to a material to be evaporated 12, a film, a tape or the like made of thin steel plate, a metal or a resin is used to be supplied into the evaporation chamber 16 continuously.

[0021] Here, the reason why evacuating gas of the exchange crucible 13 is performed is explained.

[0022] For example, in the case of using Al(aluminum) as an evaporation material, when a melting point of Al is about 660 °C, and an evaporating temperature is about 1500 °C, a temperature of 1000 °C or more is preferable for evacuating gas from the crucible 13. Therefore, when evacuating gas of the crucible 13, if an evaporation material is contained in the crucible 13, this evaporation material is melted and thus the impurities like water is mixed there into. To remove the impurities, evacuating gas is performed by heating the empty crucible 13.

[0023] Next, operation of embodiments is described.

[0024] In the case that a crucible in use 13b is exchanged or repaired, it is necessary to insert the exchange crucible 13 in the preparation chamber 16 with a vacuum shutoff valve 15 shut off, and to evacuate gas in advance by heating this crucible 13 with a

heating means at the same time as vacuuming it with a vacuum pump 17. An evaporation material which is required for melting it at the first stage is supplied from a material supply device into the exchange crucible 13 which has been already evacuated gas. After supplying an evaporation material to the exchange crucible 13, the exchange crucible 13 is transferred from the preparation chamber 16 to the evaporation chamber 10 in the direction of an arrow at the same time as that a vacuum shutoff valve 15 is opened and a used crucible 13a is transferred from the evaporation chamber 10 to the preparation chamber 16 in the direction of an arrow. After transferring both crucibles 13, 13a, a vacuum shutoff valve 15 is blocked and an evaporation process is performed while transporting continuously a material to be evaporated 12 at the same time as operating a vacuum pump11 and the electron gun 14 and the like.

[0025] The preparation chamber 16 is provided through the vacuum shutoff valve 15 in the evaporation chamber 10. Therefore, even if the preparation chamber 16 is exposed to the air and the exchange crucible 13 is introduced or the used crucible 13a is taken out, the vacuum state in the evaporation chamber 10 is maintained. In addition, it is possible to evacuate gas of the exchange crucible 13 at the same time during a vacuum evaporation operation since the preparation chamber 16 includes a heating means 19. It is possible to use the exchange crucible 13 in the evaporation chamber 10 in a short time without making a pause to evacuate gas from a vacuum evaporation device as a conventional one.

[0026] Fig.2 is a plan schematic view showing another embodiment of a vacuum evaporation device of the present invention.

[0027] In the above-mentioned figure, the difference from the embodiment shown in Fig.1 is that a extraction chamber 23 which includes a used crucible 22 is provided by a

vacuum shutoff valve 2 in an evaporation chamber 20.

[0028] When exchanging a crucible 22a in use in this vacuum evaporation device, a crucible for exchange 22b is inserted in a preparation chamber 25 with a vacuum shutoff valve 24 blocked, and evacuating gas of a crucible for exchange 22b is performed by operating a heating means 27 at the same time as vacuuming by operating a vacuum pump 26. Thus, a required amount of evaporation material is supplied in a crucible 22b in which evacuating gas is finished from a material supply device 28. After that a vacuum shutoff valve 21 is opened and a used crucible 22 is transferred in the direction of an arrow from the evaporation chamber 20 to the extraction chamber 23, the used crucible 22 is transferred to the extraction chamber 23, then the vacuum shutoff valve 21 is blocked and a exchange crucible 22b is transferred in the direction of an arrow from the preparation chamber 25 to the evaporation chamber 20 with opened a vacuum shutoff valve. After the exchange crucible 22b is transferred into the evaporation chamber 20, an evaporation process is started by operating a vacuum pump 29 and an electron gun 30 and the like. At this time, evacuating gas in the extraction chamber 23 is performed by operating a vacuum pump 31.

[0029] According to the present embodiment as mentioned above, since the preparation chamber 16 is provided in the evaporation chamber 10 through the vacuum shutoff valve 15, the vacuum state in the evaporation chamber 10 is maintained even if the preparation chamber 16 is exposed to the air. In addition, it is possible to evacuate gas of the exchange crucible 13 during a vacuum evaporation operation at the same time since the preparation chamber 16 includes a heating means 19. It is also possible to use the exchange crucible 13 in the evaporation chamber 10 without making a pause to evacuate gas from a vacuum evaporation device as a conventional one.

[0030] Note that the present embodiment, one is explained using a crucible but it is not limited to this, a liner may be also used. In addition, a supply device which supplies an evaporation material may be provided in an evaporation chamber.

[0031]

[Effect of the invention] Thus, after all the present invention offers the following great advantages.

[0032] (1) The time for exchanging a crucible can be drastically reduced.

[0033] (2) It becomes unnecessary to expose an evaporation chamber to the air for exchanging a crucible or maintenance, and the wasted time to evacuate gas can be cut.

[0034] (3) Since a preparation chamber includes a heating means, evacuating gas of a crucible can be performed before exchanging.

[0035] (4) Introducing an evaporation material in after heating a crucible can prevent impurities from being mixed in an evaporation material due to produced gas.

[Brief Description of Drawings]

[Fig.1] a plane schematic view showing a major part of one embodiment of a vacuum evaporation device according to the present invention.

[Fig.2] a plane schematic view of a vacuum evaporation device in another embodiment of the present invention.

[Fig.3] an external perspective view of a conventional vacuum evaporation device.

[Fig.4] a schematic view showing a major part of a vacuum evaporation device shown in Fig.3.

[Explanation of references]

10, 20 evaporation chamber

11, 17, 26, 29, 31 vacuum pump

12 material to be evaporated

13, 22b exchange crucible

13a, 22 used crucible

13b, 22a crucible in use

14, 30 electron gun

15, 21, 24 vacuum shutoff valve

16 preparation chamber

18, 28 material supply device

19, 27 heating means

23 extraction chamber

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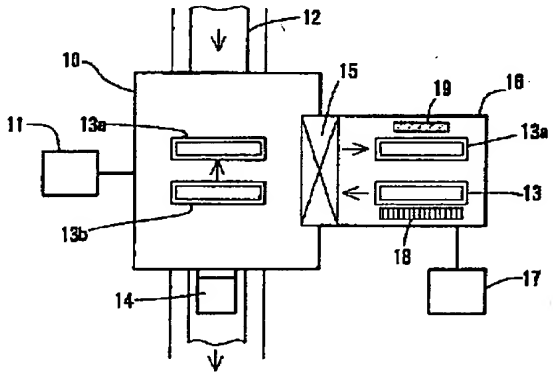
(54)【発明の名称】　真空蒸着装置

(57)【要約】

【目的】　蒸発るつぼの交換、メンテナンス時に真空容器を大気開放することなく、しかも休止時間が短い真空蒸着装置を提供することにある。

【構成】　蒸発るつぼを収容した真空の蒸着室１０内に薄板状の被蒸着部材を連続して通過させて真空蒸着する真空蒸着装置において、蒸着室１０に真空遮断弁１５を介して設けられ、交換用の蒸発るつぼ１３を加熱する加熱手段１９を有する準備室１６を備えたことを特徴としている。



10　蒸着室
12　被蒸着部材
13a　使用済みのるつぼ
14　電子銃
16　準備室
19　加熱手段
11, 17　真空ポンプ
13　交換用のるつぼ
13b　使用中のるつぼ
15　真空遮断弁
18　材料供給装置

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【特許請求の範囲】

【請求項１】　蒸発るつぼを収容した真空容器内に、薄板状の被蒸着部材を連続して通過させて真空蒸着する真空蒸着装置において、前記真空容器に、真空遮断弁を介して設けられ、交換用の蒸発るつぼを加熱する加熱手段を有する準備室を備えたことを特徴とする真空蒸着装置。

【請求項２】　前記真空容器に、他の真空遮断弁を介して設けられ、使用済みの蒸発るつぼを収容する取出し室を備えたことを特徴とする請求項１に記載の真空蒸着装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、蒸発るつぼを収容した真空容器内に、薄板状の被蒸着部材を連続して通過させて真空蒸着する真空蒸着装置に関する。

【０００２】

【従来の技術】金属からなる蒸着部材を、薄板状の被蒸着部材に連続的に被膜を形成する装置として真空蒸着装置がある。

【０００３】図３は従来のこの種の真空蒸着装置（ライボルト社製（ドイツ））の外観斜視図であり、図４はその主要部の模式図である。

【０００４】図３及び図４において、真空蒸着装置は、真空容器としての蒸着室（以下蒸着室という）１と、蒸着室１に接続され蒸着室１を真空にするための真空ポンプ２と、蒸着室１内に配置され連続的に被膜を形成すべき薄板状の被蒸着部材３が巻き付けられた供給ロール４と、蒸着室１内に設けられ被膜となるべき蒸着材料を収容する蒸発つるぼ（以下るつぼという）５と、蒸着室１に取り付けられ、蒸着材料に電子ビームを照射して蒸発させ、供給ロール４から引き出された被蒸着部材３に蒸着材料の被膜を形成するための電子銃６と、蒸着済みの被蒸着部材３を巻き取る巻き取りロール７と、蒸着室１に挿入取出し可能に設けられ使用済みのるつぼ５ａを交換するためのるつぼ交換室８とで構成されている。

【０００５】

【発明が解決しようとする課題】しかしながら、前述した従来の真空蒸着装置には以下のような問題点がある。

【０００６】(1) 使用中のるつぼが破損または不具合が生じて交換したり、メンテナンスを行ったりする場合に蒸着室を大気開放しなければならず、装置規模が大きくなると再排気時、すなわち休止時に長時間を要する。

【０００７】(2) るつぼの材質がセラミック系やグラファイト系の場合、新品のるつぼはガスを多量に吸収しているため、そのまま直接蒸着室内に入れた場合、ガス出しに長時間を要する。

【０００８】(3) 蒸着室の外部で新品のるつぼを加熱してガス出しを行う場合、ガス出しした後に蒸着室に挿入するまでの間に大気中のガスを吸収してしまう。

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【０００９】(4) るつぼ交換室には、るつぼを加熱する加熱手段や蒸着材料を供給する装置がないため、ガス出しや初期溶湯作りができない。

【００１０】そこで、本発明の目的は、上記課題を解決し、蒸発るつぼの交換、メンテナンス時に真空容器を大気開放することなく、しかも休止時間が短い真空蒸着装置を提供することにある。

【００１１】

【課題を解決するための手段】上記目的を達成するために本発明は、蒸発るつぼを収容した真空容器内に、薄板状の被蒸着部材を連続して通過させて真空蒸着する真空蒸着装置において、真空容器に、真空遮断弁を介して設けられ、交換用の蒸発るつぼを加熱する加熱手段を有する準備室を備えたものである。

【００１２】また、本発明の真空蒸着装置は、真空容器に、真空遮断弁を介して設けられ、使用済みの蒸発るつぼを収容する取出し室を備えたものである。

【００１３】

【作用】上記構成によれば、真空容器に真空遮断弁を介して準備室が設けられているので、準備室を大気開放しても真空容器の真空状態が保持される。また、準備室が加熱手段を有するので、真空蒸着作業中に同時に交換用のるつぼのガス出しを行うことができ、真空蒸着装置をガス出しのために休止することなく交換用のるつぼを使用することができる。

【００１４】

【実施例】以下、本発明の一実施例を添付図面に基づいて詳述する。

【００１５】図１は本発明の真空蒸着装置の一実施例の主要部の平面模式図である。

【００１６】同図において真空蒸着装置は、真空容器としての蒸着室１０と、この蒸着室１０に接続され蒸着室１０の真空引きを行う真空ポンプ１１と、蒸着室１０内を連続的に通過すると共に、被膜を形成すべき薄板状の被蒸着部材１２と、蒸着室１０内に設けられこの被蒸着部材１２上に被膜を形成すべき蒸着材料を収容する交換用のるつぼ１３と、蒸着室１０に取り付けられ蒸着材料に電子ビームを照射して蒸発させ、被蒸着部材１２に蒸着材料の被膜を形成するための電子銃１４と、蒸着室１０の側面に取り付けられ蒸着室１０を開放または遮断することが可能な真空遮断弁１５と、この真空遮断弁１５に取り付けられ交換用のるつぼ１３及び使用済みのるつぼ１３ａを収容する準備室１６と、準備室１６に接続され準備室１６を真空にする真空ポンプ１７と、準備室１６に設けられ交換用のるつぼ１３内に蒸発材料を供給する材料供給装置１８と、準備室１６内に設けられ交換用のるつぼ１３を加熱する加熱手段１９とで構成されている。

【００１７】準備室１６には、交換用のるつぼ１３を挿入するための挿入扉と、使用済みのるつぼ１３ａを取出

すための取出し扉が設けられており（共に図示せず）、通常はこれらの挿入扉や取出し扉は閉じられている。

【００１８】真空遮断弁１５は、真空蒸着作業中や、準備室１６内に交換用のるつぼ１３を挿入したり、準備室１６から使用済みのるつぼ１３ａを取出したり、交換用のるつぼ１３をガス出しのために加熱したりする時には蒸着室１０と準備室１６との間を遮断し、準備室１６内から蒸着室１０内へ交換用のるつぼ１３を移動したり、蒸着室１０内から準備室１６内へ使用済みのるつぼ１３ａを移動したりする時には蒸着室１０と準備室１６との間を開放するようになっている。

【００１９】各るつぼ１３、１３ａの、蒸着室１０内と準備室１６内との間の移動は、図示しない移動機構により行われるようになっている。

【００２０】被蒸着部材１２には薄板鋼板、金属や樹脂等の材料からなるフィルムやテープ等が用いられ、蒸着室１０内に連続的に供給されるようになっている。

【００２１】ここで、交換用のるつぼ１３のガス出しを行う理由について述べる。

【００２２】例えば、蒸着材料にＡｌ（アルミニウム）を用いた場合、Ａｌの融点は約６６０℃であるが、蒸発温度を約１５００℃程度とすると、るつぼ１３のガス出しには１０００℃以上の温度が望ましい。したがってるつぼ１３のガス出し時に、るつぼ１３内に蒸着材料が収容されていると、この蒸着材料が溶解して水等の不純物が混入してしまう。そこで不純物を除去するためにるつぼ１３を空のまま加熱してガス出しを行うのである。

【００２３】次に実施例の作用を述べる。

【００２４】使用中のるつぼ１３ｂを交換または修理する場合、真空遮断弁１５を遮断した状態で準備室１６に交換用のるつぼ１３を挿入し、真空ポンプ１７で真空引きすると共に加熱手段１９によってこのるつぼ１３を加熱することによりあらかじめガス出しをしておく。ガス出し処理の済んだ交換用のるつぼ１３内に、材料供給装置１８から初期溶湯作りに必要な量だけ蒸着材料を供給する。交換用るつぼ１３に蒸着材料の供給した後真空遮断弁１５を開放し、蒸着室１０から準備室１６へ使用済みのるつぼ１３ａを矢印方向に移動すると共に、準備室１６から蒸着室１０へ交換用のるつぼ１３を矢印の方向に移動する。両るつぼ１３、１３ａを移動した後真空遮断弁１５を遮断し、真空ポンプ１１、電子銃１４等を作動すると共に、被蒸着部材１２を連続的に搬送して蒸着プロセスを行う。

【００２５】蒸着室１０に真空遮断弁１５を介して準備室１６が設けられているので、準備室１６を大気開放して交換用のるつぼ１３を挿入したり、使用済みのるつぼ１３ａを取出しても蒸着室１０内の真空状態が保持される。また、準備室１６が加熱手段１９を有するので、真空蒸着作業中に同時に交換用のるつぼ１３のガス出しを行うことができ、従来のように真空蒸着装置をガス出しのために休止することがなく、交換用のるつぼ１３を短時間に蒸着室１０内で使用することができる。

【００２６】図２は本発明の真空蒸着装置の他の実施例の平面模式図である。

【００２７】同図において図１に示した実施例との相違点は、蒸着室２０に真空遮断弁２１を介して使用済みのるつぼ２２を収容する取出し室２３が設けられた点である。

【００２８】この真空蒸着装置内の使用中のるつぼ２２ａを交換する場合、前述と同様に、真空遮断弁２４を遮断した状態で準備室２５内に交換用のるつぼ２２ｂを挿入し、真空ポンプ２６を作動させて真空引きを行うと共に，加熱手段２７を作動させて交換用のるつぼ２２ｂのガス出しを行い、ガス出しが終了したるつぼ２２ｂ内に材料供給装置２８より蒸発材料を必要量だけ供給しておく。真空遮断弁２１を開放し、使用済みのるつぼ２２を蒸着室２０から取出し室２３へ矢印の方向に移動し、取出し室２３内に使用済みのるつぼ２２が移動した後真空遮断弁２１を遮断し、真空遮断弁２４を開放して準備室２５から蒸着室２０へ交換用のるつぼ２２ｂを矢印の方向に移動させる。交換用のるつぼ２２ｂが蒸着室２０内に移動した後、真空ポンプ２９、電子銃３０等を作動させて蒸着プロセスを開始する。このとき真空ポンプ３１を作動して取出し室２３内の真空引きを行う。

【００２９】以上のように本実施例によれば、蒸着室１０に真空遮断弁１５を介して準備室１６が設けられているので、準備室１６を大気開放しても蒸着室１０の真空状態が保持される。また、準備室１６が加熱手段１９を有するので、真空蒸着作業中に同時に交換用のるつぼ１３のガス出しを行うことができ、真空蒸着装置をガス出しのために休止することなく交換用のるつぼ１３を使用することができる。

【００３０】尚、本実施例ではるつぼを用いて説明したが、これに限定されるものではなく、ライナーを用いてもよい。また、蒸発材料を供給する供給装置が蒸着室に設けられてもよい。

【００３１】

【発明の効果】以上要するに本発明によれば、次のような優れた効果を発揮する。

【００３２】(1) るつぼの交換時間が大幅に短縮できる。

【００３３】(2) るつぼの交換、メンテナンスのために蒸着室を大気開放する必要がなくなり、無駄な真空排気時間がなくなる。

【００３４】(3) 準備室が加熱手段を有しているので、交換前にるつぼのガス出しを行うことができる。

【００３５】(4) るつぼ加熱後に蒸発材料を入れることによって、発生ガスによる蒸発材料への不純物混入を防止することができる。

【図面の簡単な説明】

5

【図１】本発明の真空蒸着装置の一実施例の主要部の平面模式図である。

【図２】本発明の真空蒸着装置の他の実施例の平面模式図である。

【図３】従来の真空蒸着装置の外観斜視図である。

【図４】図３に示した真空蒸着装置の主要部の模式図である。

【符号の説明】

１０、２０　蒸着室

１１、１７、２６、２９、３１　真空ポンプ

6

１２　被蒸着部材

１３、２２ｂ　交換用のるつぼ

１３ａ、２２　使用済みのるつぼ

１３ｂ、２２ａ　使用中のるつぼ

１４、３０　電子銃

１５、２１、２４　真空遮断弁

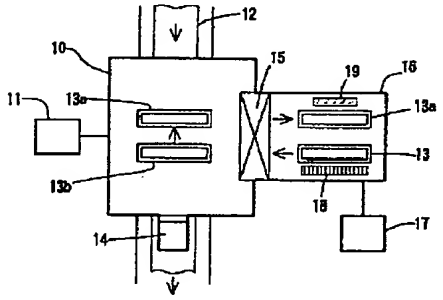
１６　準備室

１８、２８　材料供給装置

１９、２７　加熱手段

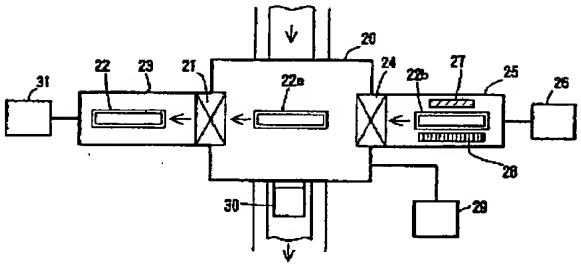
10　２３　取出し室

【図１】

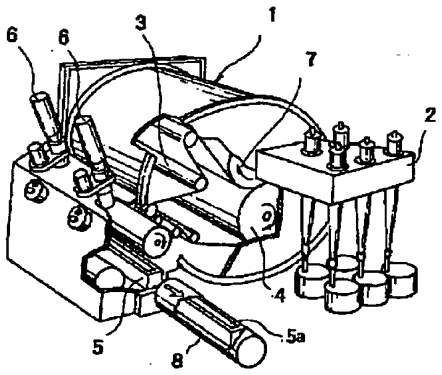


10 蒸着室
12 被蒸着部材
13a 使用済みのるつぼ
14 電子銃
16 準備室
19 加熱手段
11, 17 真空ポンプ
13 交換用のるつぼ
13b 使用中のるつぼ
15 真空遮断弁
18 材料供給装置

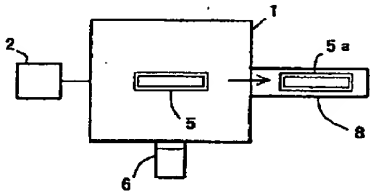
【図２】



【図３】



【図４】



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